People with low back pain who have externalised beliefs need to see greater improvements in symptoms to consider exercises worthwhile: an observational study

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Question: Does health locus of control predict the smallest worthwhile effect of motor control exercise or spinal manipulative therapy when adjusted for severity of pain? **Design:** Cross-sectional observational study. **Participants:** 86 people with non-specific low back pain who had not yet commenced physiotherapy intervention. **Outcome measures:** Predictors were severity of pain measured over the last 7 days using an 11-point scale from 0 to 10, and external and internal health loci of control measured using Form C of the Multidimensional Health Locus of Control scale. The outcome of interest was smallest worthwhile effect which was measured in terms of the percentage perceived change necessary to make two evidence-based physiotherapy interventions for non-specific low back pain (motor control exercise and spinal manipulative therapy) worthwhile. Data were collected before intervention commenced. **Results:** Multivariate analysis showed that when adjusted for pain and internal locus of control, external locus of control predicted the smallest worthwhile effect for motor control exercise (β 0.79; CI 0.10 to 1.48), explaining 0.07 of the variance. None of the predictors significantly predicted the smallest worthwhile effect for spinal manipulative therapy. **Conclusion:** Patients with low back pain who have externalised beliefs and agree more strongly with the notion that others are responsible for their condition report higher estimates of smallest worthwhile effect of an active intervention such as motor control exercise than patients who do not have externalised beliefs. **[Oliveira VC, Ferreira PH, Ferreira ML, Tibúrcio L, Pinto RZ, Oliveira W, Dias R (2009) People with low back pain who have externalised beliefs need to see greater improvements in symptoms to consider exercises worthwhile: an observational study. *Australian Journal of Physiotherapy* 55: 271–275]**

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Introduction

Non-specific low back pain is a common cause of long-term disability, mainly in economically active populations (Anderson 1999), with a lifetime prevalence of 70% to 85% (Anderson 1999, Costa 2007, Loney and Stratford 1999, Silva 2004). Due to the considerable burden associated with this condition, a number of evidence-based interventions have been found for its management (Ferreira 2003, Ferreira 2006, Ferreira 2007, Van Tulder 2000). Evidence supporting these interventions is usually provided by systematic reviews and randomised trials and the interpretation of their results should be based not only on statistical significance but also on clinical significance (Barrett 2005, Chan 2001, Ferreira 2009, Herbert 2000a, 2000b, Van Tulder 2007). Recently, the concept of the smallest effect that makes an intervention worthwhile involving the opinions of recipients of care on the magnitude of an intervention effect that justifies its costs, risks, and inconvenience has been advocated (Barrett 2005, Barrett 2007, Ferreira 2009). Ferreira and colleagues (2009) termed this the 'smallest worthwhile effect' and have shown that, on average, patients with nonspecific low back pain need to be 'much better' or 42% improved to consider the costs, risks, and inconveniences of physiotherapy intervention worthwhile (Ferreira 2009).

Information on predictors of patients' perceptions of the smallest worthwhile effect of intervention is scarce. Ferreira and colleagues (2009) found that the smallest worthwhile effect of physiotherapy intervention for low back pain is positively associated with severity of symptoms, but not with age, duration of symptoms, or past experience with physiotherapy. However, if recipients of care are involved in the decision of how much improvement represents clinical significance, it is sensible to argue that their psychosocial background may influence their perceptions of worthwhile benefits. *Health locus of control* is a term used to define a person's belief about the causes of their good or poor health. Locus of control is classified as internal (individual believes that he/she is responsible for his/her own health), external (individual believes that others are responsible for his/her health), or chance (individual believes that chance is responsible for his/her health). This construct has been associated with, for instance, both the risk and prognosis of low back pain (Clays 2007, Koleck 2006, Linton 2000, Waddell and Burton 2001). Moreover, it would be expected that people with low back pain who demonstrate high internal health locus of control (individual believes that he/she is responsible for his/her own health) would agree with the goals of active interventions such as motor control exercise (Braman and Gomez 2004, Hashimoto and Fukuhara 2004). Conversely, people with low back pain presenting with high levels of external locus of control (individual believes that others are responsible for his/her health) would more likely agree with the goals of passive

interventions such as spinal manipulative therapy (Braman and Gomez 2004, Hashimoto and Fukuhara 2004). We argue that these aspects of the intervention could influence what would constitute their smallest worthwhile effect.

The specific research questions of this study therefore were:

1. Does health locus of control predict the smallest worthwhile effect of motor control exercise when adjusted for severity of pain?
2. Does health locus of control predict the smallest worthwhile effect of spinal manipulative therapy when adjusted for severity of pain?

These interventions were chosen because they have been shown to be effective in reducing pain and disability in chronic low back pain (Ferreira 2003, Ferreira 2007) and preventing recurrence after an acute episode of low back pain (Ferreira 2006). Also, they are located at either end of the spectrum of involvement of patients in the intervention, with motor control exercises requiring a significant amount of involvement whilst spinal manipulative therapy requires little involvement from patients.

Method

Design

A cross-sectional observational study was conducted involving people with non-specific low back pain patients. Patients were recruited from outpatient physiotherapy departments of public hospitals and private clinics of Belo Horizonte, Brazil. Participants were contacted and all data were collected on the day prior to the commencement of intervention. First, severity of backpain and health locus of control were collected. Then, participants were read a standardised script about two evidence-based physiotherapy interventions for non-specific low back pain (motor control exercise and spinal manipulative therapy) in random order (Ferreira 2009). The script outlined in lay and general terms how the intervention was administered, the usual number and length of sessions, and the proposed benefits, risks and costs of the intervention (see Appendix 1 on the eAddenda for the scripts). Information of usual number and length of sessions was gathered from a randomised trial (Ferreira 2007). After explanation of each intervention, participants were asked what constituted their smallest worthwhile effect for each intervention.

Participants

Patients of both genders were included if they presented with non-specific low back pain and were between 18 and 80 years old. They were excluded if they had been diagnosed with specific spinal pathology such as nerve root involvement, inflammatory disorders, fracture, or malignancy. Demographic characteristics of the participants were collected as well as back pain-associated disability using the Roland Morris Disability questionnaire, and fear of movement using the TAMPA scale of Kinesiophobia.

Outcome measures

Predictors were health locus of control and severity of pain. Severity of pain was included as a recent study has shown that it is associated with the smallest worthwhile effect of people with low back pain (Ferreira et al 2009). Severity of pain over the last 7 days was measured on an 11-point scale where 0 is no pain and 10 is the worst pain possible. Health locus of control was measured using the Multidimensional Health Locus of Control scale developed by Wallston and colleagues (1978). This scale is presented in three forms (A, B, and C), the first two aiming at investigating general health locus of control (Wallston 2005) and the third form designed to assess locus of control beliefs regarding specific conditions such as low back pain (Wallston 1994). In the present study, Form C was used to assess health locus of control. The scale consists of three independent, six-item subscales:

1. Internal locus of control is measured by Items 1, 6, 8, 12, 13, and 17; individuals with high scores in these items believe that they are responsible for their own health
2. External locus of control is measured by Items 3, 5, 7, 10, 14, and 18; individuals with high scores in these items believe that others are responsible for their health
3. Chance locus of control is measured by Items 2, 4, 9, 11, 15, and 16; individuals with high scores in these items believe that chance is responsible for their health.

Each item is scored between 1 to 6 points, therefore, for each subscale, a minimum score of 6 and a maximum of 36 can be achieved. The results are presented separately for the two subscales: internal and external locus of control.

The outcome of interest was the smallest worthwhile effect. After an explanation of the two interventions (motor control exercises and spinal manipulative therapy) and prior to commencement of intervention, participants were asked to rate their smallest worthwhile effect for each intervention on a continuous visual analogue scale (from 0% better to 100% better).

Data analysis

A priori power analysis showed that a sample size of 86 individuals would provide an 80% chance of detecting a correlation of 0.4 between the predictors and the smallest worthwhile effect if an expected correlation of 0.2 between the predictors was present (Maxwell 2005). Results from a pilot study (n = 15) showed that test-retest reliability of the smallest worthwhile effect scale for the two interventions (motor control exercise and spinal manipulative therapy) had an ICC type II (Walter 1998) of 0.95 (95% CI 0.86 to 0.98) and 0.92 (95% CI 0.75 to 0.97), respectively. The total scores (ranging from 6 to 36 points) for the external and internal locus of control subscales were used in the analyses. Multiple linear regression was performed to produce a model of the prediction of smallest worthwhile effect by entering all *a priori* selected predictors (symptom severity, external locus of control, and internal locus of control) (Portney and Watkins 2002). The significance level was set at 0.05.

Results

Participants

Eighty-six people with low back pain participated in the study and their characteristics are presented in Table 1. They were around 40 years old, half were married, and most of them were female, had finished high school and had had low back pain for more than 3 months. On average, they needed to see 63% (SD 22) and 62% (SD 28) improvement in their symptoms to consider motor control exercises and spinal manipulative therapy worthwhile, respectively.

Table 1. Characteristics of participants.

Characteristic	(n = 86)
Age *(yr),* mean (SD)	36.9 (11.5)
Gender, n female (%)	60 (70)
Low back pain duration *(mth)*, n (%)	
< 3 mth	21 (24)
3 to 6 mth	9 (11)
7 to 12 mth	13 (15)
> 12 mth	43 (50)
Marital status, n (%)	
Married	37 (43)
Single	37 (43)
Divorced	12 (14)
Education level completed, n (%)	
University	40 (47)
High school	30 (35)
Primary school	16 (19)
Roland Morris Questionnaire *(0 to 24),* mean (SD)	7.5 (4.5)
Kinesiophobia *(17 to 68),* mean (SD)	38.1 (7.4)
Severity of pain over last 7 days *(0 to 10),* mean (SD)	5.1 (2)
Health locus of control *(6 to 36)*, mean (SD)	
External subscale	23.7 (7.0)
Internal subscale	29.0 (5.2)
Chance subscale	10.3 (5.0)
Smallest worthwhile effect *(%)*, mean (SD)	
Exercise	63 (22)
Spinal manipulative therapy	62 (28)

Prediction of the smallest worthwhile effect for motor control exercise

Multivariate analysis showed that when adjusted for pain and internal locus of control, external locus of control independently predicted the smallest worthwhile effect (β 0.79, CI 0.10 to 1.48, p = 0.03). The prediction equation explained 0.07 of the variance in smallest worthwhile effect for motor control exercise (Box 1).

Prediction of the smallest worthwhile effect for spinal manipulative therapy

Multivariate analysis showed that the three predictors explained 0.03 of the variance in smallest worthwhile effect for spinal manipulative therapy (Box 2).

Discussion

Recipients of care should be involved in the estimation of smallest worthwhile effect so that evidence provided by randomised trials and meta-analyses can be used in the decision of whether interventions are clinically significant. However, patients' perceptions of worthwhile intervention effects may be influenced by their beliefs about where responsibility lies for their health. Our results have shown that patients who believe responsibility lies externally need to see a greater improvement to consider motor control exercises worthwhile. This additional predictor can now be added to the list of known predictors of the smallest worthwhile effect which includes severity of symptoms, age, duration of symptoms, and past experience with physiotherapy.

Box 1. Mean (95% CI) regression coefficients of predictors and prediction equation from the multivariate analysis and accuracy of prediction for smallest worthwhile effect of motor control exercises.

Regression coefficients of predictors

Constant = 55 (24 to 87)

Severity of pain = –0.66 (–1.68 to 3.00)

Internal locus of control = –0.51 (–1.42 to 0.41)

External locus of control = 0.79 (0.10 to 1.48)

Prediction equation

Smallest worthwhile effect of motor control exercises *(%)*

= 55

– 0.7 severity of pain *(0 to 10)*

– 0.5 internal locus of control *(6 to 36)*

+ 0.8 external locus of control *(6 to 36)*

Accuracy of prediction

R^2 = 0.07

Box 2. Mean (95% CI) regression coefficients of predictors and prediction equation from the multivariate analysis and accuracy of prediction for smallest worthwhile effect of spinal manipulative therapy.

Regression coefficients of predictors

Constant = 29 (–10 to 69)

Severity of Pain = 1.26 (–1.67 to 4.19)

Internal locus of control = 0.60 (–0.55 to 1.75)

External locus of control = 0.35 (–0.51 to 1.21)

Prediction equation

Smallest worthwhile effect of motor control exercises *(%)*

= 29

+ 1.3 severity of pain *(0 to 10)*

+ 0.6 internal locus of control *(6 to 36)*

+ 0.4 external locus of control *(6 to 36)*

Accuracy of prediction

R^2 = 0.03

The external locus of control subscale consists of 6 items, each ranging from 1 to 6, so total scores range from 6 to 36. Two patients at either end of the scale would therefore differ by 30 points. Our prediction equation suggests that this represents a difference of 24% in the smallest worthwhile effect of motor control exercises, after adjusting for severity of symptoms. Therefore, during the course of intervention, if a therapist could reduce external locus of control to the lowest possible score, the chances of a patient being satisfied with the effect of intervention would increase by up to 24%. Altering the health locus of control of people with low back pain during intervention appears to be promising since previous research has shown a reduction in reliance on health professionals as a result of cognitive behavioural therapy (Moffett et al 2006).

Form C of the Multidimensional Health Locus of Control scale was used in the present study, as it contextualises health locus of control beliefs to specific health conditions, such as chronic low back pain. Past research has demonstrated that its subscales are internally consistent and unidimensional (Wallston 1994). In the current study,

we found only a small and non-significant correlation between internal and external locus of control subscales (r = 0.14, p = 0.28) confirming the unidimensional nature of its subscales. Moreover, only 6 (7%) of the participants had high scores (ie, > 30) on both the internal and external locus of control subscales. We performed a sensitivity analysis to assess the impact of these 6 participants by removing them from the multivariate analyses. A small change in regression coefficients and significance was observed for severity of pain (β 1.06, CI –1.37 to 3.50, p = 0.39), internal locus of control (β –0.40, CI –1.34 to 0.54, p = 0.40) and external locus of control (β 0.94, CI 0.20 to 1.67, p = 0.01) in predicting the smallest worthwhile effect for motor control exercise. The same tendency was observed in predicting the smallest worthwhile effect for spinal manipulative therapy from severity of pain (β 1.50, CI –1.60 to 4.59, p = 0.34), internal locus of control (β 0.57, CI –0.63 to 1.77, p = 0.35) and external locus of control (β 0.38, CI –0.56 to 1.31, p = 0.43).

Ferreira et al (2009) found that Australians with low back pain need to see, on average, an improvement of 42% to consider a physiotherapy intervention worthwhile whether it is exercise, spinal manual therapy, ultrasound, massage, or local heat compared with Brazilians who need to see a 62% improvement. These results suggest that cultural differences might also influence perceptions of worthwhile effects.

In the current study, people with low back pain had higher scores for internal health locus of control than external or chance health locus of control. Of note, Oliveira et al (2008) showed that Brazilians who had had intervention for chronic low back pain had scores for external health locus of control that were 2 points out of 30 higher than internal health locus of control scores. Arguably, it is possible that people with low back pain who are interacting with physiotherapists have their beliefs skewed towards the notion that other people, such as carers, are responsible for their health. Moreover, in the current study, the smallest worthwhile effect is based on descriptions of intervention rather than real experience with intervention because it is collected before intervention commences. More research is needed to demonstrate how the smallest worthwhile effect would be affected by patients' experiences with intervention. ■

eAddenda: Appendix 1 available at AJP.physiotherapy.asn.au.

Ethics: The Ethics Committees of the Federal University of Minas Gerais, Brazil (ETIC 420/07) approved this study. Participants gave voluntary informed consent before data collection began.

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